Lloyd's Register

Rules and Regulations for the Classification of Naval Ships, January 2012

Notice No. 3

Effective Date of Latest Amendments:

See page 1

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RULES AND REGULATIONS FOR THE CLASSIFICATION OF NAVAL SHIPS, *January 2012*

Notice No. 3

This Notice contains amendments within the following Sections of the *Rules and Regulations for the Classification of Naval Ships, January 2012.* The amendments are effective on the dates shown:

Volume	*Part*	*Chapter*	*Section*	*Effective date*
1	1	2	3	1 January 2013
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2	2	2	7	1 January 2013
2	3	1	9	1 January 2013
2	7	5	7	1 January 2013
2	8	1	15	1 January 2013
2	9	1	1, 2, 3, 4	1 January 2013
2	10	1	1, 5, 6, 7, 9, 14, 17, 21	1 January 2013
3	1	2	1, 3	1 January 2013
3	2	1	1	1 January 2013

It will be noted that the amendments also include corrigenda, which are effective from the date of this Notice.

The *Rules and Regulations for the Classification of Naval Ships, January 2012* are to be read in conjunction with this Notice No. 3. The status of the Rules is now:

Rules for Naval Ships	Effective date:	January 2012
Notice No. 1	Effective date:	1 January 2013 & Corrigenda
Notice No. 2	Effective date:	1 January 2013 & Corrigenda
Notice No. 3	Effective date:	1 January 2013

Volume 1, Part 1, Chapter 2

Classification Regulations

Effective date 1 January 2013

■ *Section 3*

Character of Classification and Class notations

3.8 Machinery and Engineering Systems notations

(*Part only shown*)

3.8.1 The following class notations are associated with the machinery construction and arrangement, and may be assigned:

ELS	This notation will be assigned where both the quality and integrity of on board electrical power supplies for designated loads meet the requirements of a relevant and acceptable Naval Standard, such as NATO Standardization Agreement (STANAG) 1008. It also denotes that the installation has been arranged, installed and tested in accordance with LR Rules.
SCM	**Screwshaft Condition Monitoring**. ~~This notation may be assigned when oil lubricated screwshaft arrangements with approved oil glands are fitted and the requirements of Ch 3,13.3 are complied with.~~ The notation will be assigned where an Owner adopts the requirements for monitoring of the screwshaft. The notation will indicate that physical and operational condition of that equipment. *See* Ch 3,13.3.

Volume 1, Part 1, Chapter 3

Periodical Survey Regulations

Effective date 1 January 2013

■ *Section 1*

General

1.6 Preparation for survey and means of access

(*Part only shown*)

1.6.6 Survey at sea or anchorage may be undertaken when the Surveyor is fully satisfied with the necessary assistance from the personnel on board and provided the following conditions and limitations are met:

(a) Surveys of tanks by means of boats or rafts is at the sole discretion of the attending Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions. Appropriate life jackets are to be available for all participants. The boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is also to be provided. ~~An oxygen meter~~ A multi-gas meter, breathing apparatus, lifeline and whistles are to be at hand during the survey. For oil supply ships an explosimeter is also to be provided.

■ *Section 13*

Screwshafts, tube shafts and propellers

13.3 Screwshaft Condition Monitoring (SCM)

(*Part only shown*)

13.3.1 Where oil lubricated shafts with approved oil glands are fitted or where a water lubricated sternbush is fitted and the requirements of 13.3.2 or 13.3.3 are met, a machinery notation **SCM** (Screwshaft Condition Monitoring) may be assigned ~~provided that the following conditions are compiled with:~~.

~~*13.3.1*~~ *13.3.2* ~~Where oil lubricated shafts with approved oil glands are fitted, a machinery notation **SCM** (Screwshaft Condition Monitoring) may be assigned provided that the following conditions are complied with~~ Oil lubricated bearings:

(a) Lubricating oil analysis to be carried out regularly at intervals not exceeding six months. The lubricating oil analysis documentation is to be available on board. Each analysis is to include the following minimum parameters:
  (i) Water content.
  (ii) Chloride content.
  (iii) Bearing material and metal particles content.
  (iv) Oil ageing (resistance to oxidation).
  Oil samples are to be taken under service conditions and are to be representative of the oil within the sterntube.
(b) Oil consumption is to be recorded.
(c) Bearing temperatures are to be recorded, (two temperature sensors or other approved arrangements are to be provided).
(d) Facilities are to be provided for measurement of bearing weardown.
(e) Oil glands are to be capable of being replaced without withdrawal of the screwshaft.

13.3.3 Water lubricated bearings:

(a) A means of monitoring and recording variations in the flow rate of lubricating water using two independent sensors is to be provided.
(b) A means of monitoring and recording variation in the shaft power transmission is to be provided.
(c) A maximum permitted weardown of the sternbush is indicated and approved wear monitoring equipment is to be fitted. The weardown allowance will include both an absolute maximum allowable weardown and the weardown at which it is recommended to carry out an inspection and maintenance. An alignment analysis considering both the newly installed clearance and the proposed absolute maximum allowable weardown, demonstrating that the system will operate satisfactorily within these two limits is to be submitted for approval.
(d) For open loop systems the manufacturer shall submit information regarding the required standard of lubricating water filtration and lubricating water filters or separators are to be fitted which are able to achieve this requirement:
  - The lubricating water supply is to be fitted with continuous water sediment measuring or turbidity monitoring equipment with the results being recorded and retained on board alternatively.
  - There shall be a LR approved extractive sampling and testing procedure with the records held on board and made available to LR on request.
  Records of cleaning and replacement of lubrication filters/separators are to be maintained on board. The pumping and water filtration system are to be considered part of the continuous survey cycle and are to be subject to a Periodical Survey.
(e) Where a closed cycle water system is used then the pumping and water filtration system are to be considered part of the continuous survey cycle and are to be subject to a Periodical Survey. Water analysis is to be carried out regularly at intervals not exceeding six months. Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube. Analysis results are to be retained on board and made available to LR on request. The analysis is to include the following parameters;
  (i) Chloride content
  (ii) Bearing material and metal particles content.
(f) The shaft shall either be constructed of corrosion resistant material or protected with an approved corrosion resistant protective liner or coating. Where a protective liner is used then this shall meet the requirements of Pt 3, Ch 2,4.14 and a means of assessing the condition of this liner or is to be submitted and approved.
(g) Glands are to be capable of being replaced without withdrawal of the screwshaft.
(h) There is to be a shaft starting/clutch engagement block to inhibit starting the shaft until lubricating water flow has been established. This shall only act as a starting block, low lubricating water flow after shaft start is to be alarm only with no shut-down.

All data collected in 13.3.3(a) to (h) is subject to the same audit requirements as given in 13.3.4. The means of monitoring and recording lubricating water flow, bearing weardown and shaft power variation are to be submitted for approval.

~~*13.3.2*~~ *13.3.4* For maintenance of **SCM** notation, the records of analyses, consumption and temperature, together with weardown readings are to be retained on board and audited annually.

~~*13.3.3*~~ *13.3.5* Where the notation **SCM** has been assigned the screwshaft need not be withdrawn at surveys as required by 13.2.1 provided all condition monitoring data is found to be within permissible limits and all exposed areas of the shaft are examined by a magnetic particle crack detection method or an alternative approved means for shafts with a protective liner, *see* 13.3.3. The remaining requirements of 13.2.1 are to be complied with. Where the Surveyor considers that the data presented is not entirely to his satisfaction the shaft will be required to be withdrawn in accordance with 13.2.1. For water lubricated bearings the screwshaft is to be withdrawn for examination as in 13.2.1, when the ship reaches 18 years from the date of build or the 3rd Special Survey - whichever comes first.

Volume 2, Part 1, Chapter 1

General Requirements for Classification of Engineering Systems

Effective date 1 January 2013

■ *Section 4*
Engineering system classification principles

4.6 Through life operation principles

4.6.8 The operating and maintenance manuals required by 4.6.7 are to be presented in a language and format that can be understood by the Operator.

Volume 2, Part 1, Chapter 2

Requirements for Design, Construction, Installation and Sea Trials of Engineering Systems

Effective date 1 January 2013

■ *Section 4*
Operating conditions

4.15 Stopping of machinery

4.15.1 Diesel engines, gas and steam turbines, ~~and~~ other prime movers and essential services are to be provided with a means of emergency stop, capable of being activated at a position outside the compartment in which the machinery is located. The arrangements are to be fully independent of control and alarm systems, and are to ensure a safe and controlled shutdown of machinery. Where such arrangements depend upon programmable electronic equipment, they are to comply with the relevant requirements in Pt 9, Ch 1,2.13.

■ *Section 5*
Machinery space arrangements

5.7 Ventilation

5.7.2 Machinery spaces are to be ~~sufficiently~~ ventilated so as to ensure that when machinery or boilers therein are operating at full power in all weather conditions, including heavy weather, a sufficient supply of air is maintained to the spaces for the safety of personnel and the operation of machinery.

5.10 Communications

5.10.4 At least two independent means of communication are to be provided between the main and emergency switchboards.

5.14 Location of emergency installations

5.14.1 Emergency sources of electrical power, fire pumps, bilge pumps except those specifically serving the spaces forward of the collision bulkhead, any fixed fire-extinguishing system and other emergency installations which are essential for the safety of the ship, except anchor windlasses, shall not be installed forward of the collision bulkhead.

■ *Section 18*
Fin stabilisers

18.2 Performance and control

18.2.6 In the event of failure of the fin actuating system, a hand pump is to be provided, mounted in a readily accessible position, which is capable of ~~centralising the fin~~ moving the fin to a known position and securing it in that position in the absence of electrical power, and being operated by no more than two men when the ship is stopped.

18.2.7 Consideration is to be given to hydraulic locking or any other condition where the equipment becomes mechanically locked and can not be operated. Where the possibility of hydraulic locking cannot be avoided, a clear indication of hydraulic lock is to be provided at the stabiliser control position.

Volume 2, Part 2, Chapter 1

Diesel Engines

Effective date 1 January 2013

■ *Section 4*
Crankshaft design

4.11 Alternative method for calculation of stress concentration factors

4.11.1 LR will give consideration to crankshaft design using an alternative method given in LR's *ShipRight procedures for alternative method for calculation of stress concentration factors in the web fillet radii of crankshafts by utilising Finite Element*.

■ *Section 7*
Air compressors and starting arrangements

7.11 Dead ship condition starting arrangements

7.11.3 Dead ship condition starting shall be possible in all ambient operating conditions, *see* Pt 1, Ch 2,4.5.

Existing paragraphs 7.11.3 *and* 7.11.4 *are to be re-numbered* 7.11.4 *and* 7.11.5.

■ *Section 9*
Control and monitoring

9.3 Electrical generator and auxiliary engine speed governors

9.3.1 Diesel engines intended for driving electrical generators are to be fitted with governors which, with fixed setting, are to control the speed within the design limits of the electrical system requirements. Unless otherwise required by the electrical system power supply requirements, the governor is to control the engine speed within 10 per cent momentary variation and five per cent permanent variation. Except where permitted in accordance with 9.3.2, this is to be achieved when full load is suddenly taken off and ~~or~~, when after running on no load for at least 15 minutes, the load is suddenly applied as follows:

(a) For engines with BMEP less than 8 bar, full load, or

(b) For engines with BMEP greater than 8 bar, 800/BMEP per cent, but not less than one-third, of full load, the full load being attained in not more than two additional equal stages as rapidly as possible.

9.3.2 In order to design the load management of the main and emergency electrical power systems in accordance with Pt 10, Ch 1,6.9, where diesel engines are of a type that cannot meet the requirements of 9.3.1(a) and (b), load step trials are to be carried out. The trials are to demonstrate the load steps that are required to increase the mechanical load on the engine from no load to full load and full load rejection, whilst keeping the momentary variations in engine speed of within 10 per cent and permanent variations in engine speed within five per cent. The results of the trials are to be submitted to LR for consideration.

Existing paragraphs 9.3.2 *to* 9.3.5 *are to be renumbered* 9.3.3 *to* 9.3.6.

~~*9.3.6* Where the electrical system power supply requirements are to comply with STANAG 1008, the requirements in 9.3.7 to 9.3.9 are also applicable. Alternative performance characteristics may be accepted where transient stability analysis required by Pt 10, Ch 1,1.8 has been submitted for consideration and accepted by Lloyd's Register (hereinafter referred to as 'LR').~~

~~*9.3.7* The cyclic irregularity of the engine speed is not to exceed 0,25 per cent where cyclic irregularity is defined as:~~

> ~~The ratio of the difference between the maximum and minimum instantaneous angular velocity at the flywheel during one engine cycle to the mean speed when the engine is running at any load up to and including rated load and at rated speed.~~

~~*9.3.8* The performance of mechanical governors is to be such that the engine steady state speed change from no load to rated load and vice versa required by 9.3.1 is between 3,5 and 4 per cent of the nominal speed. The rate of change of speed with change of load is to be not less than 0,4 times the average rate from no load to full load. For load changes of 25 per cent of the rated load, the momentary speed change is not to exceed 2,5 per cent of the nominal speed; and the speed is to remain within 1 per cent of the final steady state speed in not more than 2 seconds from the instant of load change.~~

~~*9.3.9* The performance of electronic governors is to be such that the engine steady state speed change from no load to rated load and vice versa required by 9.3.1 is between 0,875 and 1 per cent of the nominal speed. The rate of change of speed with change of load is to be not less than 0,4 times the average rate from no load to full load. For load changes of 25 per cent of the rated load, the momentary speed change is not to exceed 2,5 per cent of the nominal speed; and the speed is to remain within 0,2 per cent of the final steady state speed in not more than two seconds from the instant of load change.~~

9.7 Diesel engines for propulsion purposes

Table 1.9.1(a) Diesel engines for propulsion purposes: Alarms and slow-downs
(*Part only shown*)

Item	Alarm	Note
Lubricating oil sump level	Low	Engines ~~(and gearing if fitted)~~
Lubricating oil inlet pressure*	1st stage Low	Engines ~~(and gearing if fitted)~~. Slow-down
Lubricating oil inlet temperature*	High	Engines ~~(and gearing if fitted)~~

Table 1.9.1(b) Diesel engines for propulsion purposes: Alarms and shut-downs
(*Part only shown*)

Item	Alarm	Note
Lubricant oil inlet pressure	2nd stage low	Automatic shut-down of engines ~~(and gearing if fitted)~~, *see* 9.6.2

Volume 2, Part 2, Chapter 2

Gas Turbines

Effective date 1 January 2013

■ *Section 7*
Control, alarm and safety systems

7.3 Speed governors

7.3.4 In order to design the load management of the main and emergency electrical power systems in accordance with Pt 10, Ch 1,6.9, where gas turbines are of a type that cannot meet the requirements of 7.3.3, load step trials are to be carried out. The trials are to demonstrate the load steps that are required to increase the mechanical load on the turbine from no load to full load and full load rejection, whilst keeping the momentary variations in turbine speed within 10 per cent and permanent variations in turbine speed within five per cent. The results of the trials are to be submitted to LR for consideration.

Existing paragraph 7.3.4 *has been renumbered* 7.3.5.

~~*7.3.5* Where the electrical system power supply requirements are to comply with STANAG 1008, the requirements of 7.3.6 or 7.3.7 are also applicable. Alternative performance characteristics may be accepted where a transient stability analysis required by Pt 10, Ch 1,1.8 has been submitted for consideration and accepted by LR.~~

~~*7.3.6* The performance of mechanical governors is to be such that the turbine steady state speed change from no load to rated load and vice versa required by 7.3.3 is between 3,5 and 4 per cent of the nominal speed. The rate of change of speed into change of load is to be not less than 0,4 times the average rate from no load to full load. For load changes of 25 per cent of the rated load, momentary speed change is not to exceed 2,5 per cent of the nominal speed; and the speed is to remain within 1 per cent of the final steady state speed in not more than two seconds from the instant of load change.~~

~~*7.3.7* The performance of electronic governors is to be such that the turbine steady state speed change from no load to rated load and vice versa required by 7.3.3 is between 0,875 and 1 per cent of the nominal speed. The rate of change of speed with change of load is to be not less than 0,4 times the average rate from no load to full load. For load changes of 25 per cent of the rated load, the momentary speed change is not to exceed 2,5 per cent of the nominal speed; and the speed is to remain within 0,2 per cent of the final steady state speed in not more than two seconds from the instant of load change.~~

Volume 2, Part 3, Chapter 1

Gearing

Effective date 1 January 2013

■ *Section 9*
Control and monitoring

9.2 Unattended machinery

Table 1.9.1 Alarms and safeguards

Item	Alarm	Note
Lubricating oil sump level	Low	–
Lubricating oil inlet pressure*	1st Stage Low	Slow-down of primemover
	2nd Stage Low	Automatic shut-down of prime mover
Lubricating oil inlet temperature*	High	–
Thrust bearing temperature*	High	Slow-down of prime mover

NOTE
~~For transmitted powers of 1500 kW or less, only items marked * are required.~~ Where the prime mover is an electric motor then this is to be fitted with a means of reducing speed to enable compliance with this Table. Where gearboxes use an external oil tank for the lubricating oil supply then this is to be considered as the sump.

Volume 2, Part 7, Chapter 5

Ship Type Piping Systems

Effective date 1 January 2013

■ *Section 7*
Chilled water systems

7.1 General

7.1.5 Where chilled water is used to provide a controlled environment for equipment and machinery intended for essential services, which requires this controlled environment to function then an alternative means is to be provided to maintain the required environment in the event of a failure of the chilled water system. Failure of the chilled water system is to initiate an alarm. Duplication of the equipment requiring cooling can be provided instead of an alternative means of cooling, providing that the duplicated equipment is fed from an alternative, independent chilled water system.

Volume 2, Part 8, Chapter 1

Steam Raising Plant and Associated Pressure Vessels

Effective date 1 January 2013

■ *Section 15*

Mounting and fittings for cylindrical and vertical boilers, steam generators, pressurised thermal liquid and pressurised hot water heaters

15.11 ~~Salinometer~~ Sampling valve or cock

15.11.1 Each boiler is to be provided with a ~~salinometer~~ sampling valve or cock secured direct to the boiler in a convenient position. The valve or cock is not to be on the water gauge standpipe.

Volume 2, Part 9, Chapter 1

Control Engineering Systems

Effective date 1 January 2013

■ *Section 1*

General engineering systems

1.2 Plans and information

1.2.4 **System operational concept.** A description of how the control, alarm and safety systems for the main and auxiliary machinery and systems essential for the propulsion and safety of the ship provide effective means for operation and control during all ship operational conditions.

~~1.2.4~~ 1.2.5 **Alarm systems.** Details of the overall alarm system linking the main control station, subsidiary control stations, the bridge area and accommodation~~.~~ including details of alerts to be presented by the user interface, with:

(a) an approach to alert category assignments which is in accordance with the IMO *Code on Alerts and Indicators, 2009*; and

(b) for alarms required by these Rules the intended operator response and the message to be presented.

Existing paragraphs 1.2.5 *to* 1.2.11 *have been renumbered* 1.2.6 *to* 1.2.12.

~~1.2.7~~ 1.2.8 ~~**Control station.** Location and details of control stations, e.g. control panels and consoles.~~ Plans showing the location and details of control stations, e.g., control panels and consoles. Location and details of controls and displays on each panel. Detailed user interface specifications. A general arrangement plan of control rooms showing the position of consoles, handrails, operator area, lighting, door and window arrangements. Drawing of HVAC systems including vent arrangements.

1.3 Control, alarm and safety equipment

1.3.3 Where equipment intended for essential services requires a controlled environment, an alternative means is to be provided to maintain the required environment in the event of a failure of the normal ~~air conditioning~~ cooling system. Failure of the ~~air conditioning~~ cooling system is to initiate an alarm. Duplication of the equipment requiring cooling can be provided instead of an alternative means of cooling, providing that the duplicated equipment is fed from an alternative, independent cooling system.

■ *Section 2*
Essential features for control, alarm and safety systems

2.1 General

2.1.1 Where it is proposed to install control, alarm and safety systems to the machinery, equipment and systems listed in 1.2.2 the applicable features contained in this Section are to be incorporated in the system design.

2.3 Alarm systems, general requirements

2.3.1 Where an alarm system is to be provided alerting relevant personnel to~~, warning of~~ faults, abnormal situations and the other conditions requiring attention in machinery and engineering systems required by this Chapter or other Sections of the Rules, alarm information is to be displayed at the main control station or, alternatively, at subsidiary control stations. In the latter case, a master alarm display is to be provided at the main control station showing which of the subsidiary control stations is indicating a fault.

2.3.2 Machinery, safety and control system faults are to be indicated at the relevant control stations to advise duty personnel of a fault condition. The presence of unrectified faults is to be clearly indicated at all times.

2.3.3 Alerts associated with machinery and equipment required to satisfy this sub-Section are to be categorised according to the urgency and type of response required by the crew, as described in the IMO *Code on Alerts and Indicators, 2009*. The assignment of category to each alert is to be evaluated on the basis not only of the machinery or equipment being monitored, but also the complete installation. Categories not included in an alarm system may be omitted from the system design. Details of alternative alert management proposals supported with evidence of service experience may be submitted for consideration by LR provided they are acceptable to the Naval Authority.

2.3.4 Where the facility to provide messages in association with alerts exists, messages accompanying alerts are to describe the condition and indicate the intended response required by the crew.

2.3.5 Where the facility to provide messages in association with alerts exists, messages of different categories are to be clearly distinguishable from each other.

~~2.3.3~~ 2.3.6 Alarms associated with machinery, safety and control system faults are to be clearly distinguishable from other alarms (e.g. fire, general alarm).

~~2.3.4~~ 2.3.7 Where alarms are displayed as group alarms, provision is to be made to identify individual alarms at the main control station (if fitted) or alternatively at subsidiary control stations.

~~2.3.5~~ 2.3.8 All alarms are to be both audible and visual. If arrangements are made to silence audible ~~alarms~~ signals they are not to extinguish visual ~~alarms~~ indications.

~~2.3.6~~ 2.3.9 Acknowledgement of visual alarms is to be clearly indicated.

~~2.3.7~~ 2.3.10 Acknowledgement of alarms at positions outside a machinery space is not to silence the audible ~~alarm~~ signal or extinguish the visual ~~alarm~~ indication in that machinery space.

~~2.3.8~~ 2.3.11 If an alarm has been acknowledged and a second fault occurs prior to the first being rectified, audible signals and visual ~~alarms~~ indications are again to operate. Where alarms are displayed at a local panel adjacent to the machinery and with arrangements to provide a group or common fault alarm ~~at the main~~ in the control room ~~alarm display~~ then the occurrence of a second fault prior to the first alarm being rectified need only be displayed at the local panel, however the group alarm is to be re-initated. Unacknowledged alarms on monitors are to be distinguished by either flashing text or a flashing marker adjacent to the text. A change of colour will not in itself be sufficient to distinguish between acknowledged and unacknowledged alarms.

Existing paragraphs 2.3.9 *to* 2.3.14 *have been renumbered* 2.3.12 *to* 2.3.17.

~~2.3.15~~ 2.3.18 Disconnection or manual overriding of any part of the alarm system ~~should~~ is to be clearly indicated.

~~2.3.16~~ 2.3.19 When alarm systems are provided with means to adjust their set point, the arrangements are to be such that the final settings can be readily identified.

~~2.3.17~~ 2.3.20 Where monitors are provided at the station in control and, if fitted, in the duty engineer's accommodation, they are to provide immediate display of new alarm information regardless of the information display page currently selected. This may be achieved by provision of a dedicated alarm monitor, a dedicated area of screen for alarms or other suitable means.

~~2.3.18~~ 2.3.21 Where practicable, alarms displayed on monitors are to be displayed in the order in which they occur. Alarms requiring manual shutdown or slowdown action are to be given visual prominence.

2.3.22 Means are to be provided to test alarm and other indicator lamps.

2.9 Fixed water-based local application fire-fighting systems

2.9.6 A control panel is to be provided for managing actions such as opening of valves, starting of pumps and ~~sounding~~ initiation of ~~alarms~~ alerts, and processing information from detectors. This panel is to be independent of the fire detection control unit required by 2.8.

2.9.7 Alarms are to be initiated upon activation of a system and are to indicate the specific zone activated at the control panel. Alarms are to be provided in each protected space, at an attended machinery control station and in the wheelhouse. The audible ~~alarm~~ signal is to be distinguishable from other safety system ~~alarms~~ signals.

2.10 Programmable electronic systems – General requirements

~~*2.10.16* User interfaces are to enable timely access to desired information or control of functions. A system overview is to be readily available.~~

~~*2.10.17* The keyboard is to be divided logically into functional areas. Alphanumeric, paging and specific system keys are to be grouped separately.~~

~~*2.10.18* Where a function may be accessed from more than one interface, the arrangement of displays and controls is to be consistent.~~

~~*2.10.19* The size, colour and density of information displayed to the operator are to be such that information may be easily read from the normal operator position under all operational lighting conditions.~~

~~*2.10.20*~~ *2.10.16* Display units are to comply with the requirements of an acceptable National or International Standard, e.g. IEC 60950:2005, *Information technology equipment – Safety*, *including electrical business equipment*, in respect of emission of ionising radiation.

~~*2.10.21* The symbols used in mimic diagrams for the services listed in Pt 10, Ch 1,1.5.1 are to be consistent across all displays.~~

Existing paragraphs 2.10.22 *to* 2.10.25 *have been renumbered* 2.10.17 *to* 2.10.20.

■ *Section 3*

Ergonomics of control stations

3.1 Objectives

3.1.1 In order to take account of operator tasks at control stations, enhance usability and reduce human error, the layout arrangements are to comply with the requirements set out in 3.2.

3.1.2 In order to establish a working environment that has minimum distractions, is sufficiently comfortable, helps maintain vigilance and maximises communication amongst operators at main control stations, the requirements of 3.3 are to be complied with.

3.1.3 The requirements of 3.4 to 3.6 apply to operator interfaces for essential engineering systems located either locally, remotely or within the main control room. The requirements are intended to enhance the usability of systems and equipment, reduce human error, enhance situational awareness and support safe and effective monitoring and control under normal and abnormal modes of operation.

3.2 Control station layout

3.2.1 Control stations are to provide sufficient space and access for the intended number of operators in the expected operating conditions.

3.2.2 Local control stations are to be positioned to minimise the risk of harm to the operator.

3.2.3 Controls, displays and indicators are to be both logically and physically grouped according to their function.

3.2.4 Where a function may be accessed from more than one interface, the arrangement of displays and controls is to be consistent.

3.2.5 Frequently used controls and displays are to be within easy reach and visible to the operator from the normal working position.

3.2.6 Controls and displays used infrequently and which may be used in an emergency are to be clearly identifiable, clearly visible, easily accessible and positioned to allow safe operability.

3.2.7 The relationship of a control with a display is to be immediately apparent.

3.2.8 The relationship of controls and displays with the equipment under control is to be immediately apparent.

3.2.9 There is to be adequate spacing between controls and between controls and obstructions.

3.2.10 Controls and their associated displays are to be located such that the information on the displays can be easily read during the operation of the controls.

3.2.11 Indicators related to controls are to be visible during their operation.

3.2.12 Instruments are to face the operator's intended working position.

3.3 Physical environment

3.3.1 Control stations are to be positioned, as far as practicable, away from, or insulated against, sources of structurally transmitted vibration and noise, such as ventilation fans, engine intake fans and other noise sources.

3.3.2 In general, noise levels are to comply with IMO Res. A.468(XII), Code on Noise Levels on Board Ships, and take into account IMO Res. A.343(IX), *Recommendation on Methods of Measuring Noise. Levels at Listening Posts*.

3.3.3 Where provided, the heating, ventilation and air-conditioning system is to be capable of maintaining the temperature between 18°C and 27°C.

3.3.4 Where provided, the heating, ventilation and air-conditioning system should be capable of providing and maintaining a relative humidity within a range from 30 per cent minimum to 70 per cent maximum.

3.3.5 The flow of air from heating or air-conditioning systems is not to be guided directly to the operator, or means are to be provided to adjust the direction of air flow from those systems.

3.3.6 Lighting is to be located to avoid glare from working and display surfaces, and is to be flicker-free. Surfaces are to have a non-reflective or matt finish.

3.3.7 Placement of controls, displays and indicators are to consider the position of light sources relative to the operator with respect to reflections and evenness of lighting.

3.3.8 Where a transparent cover is fitted over a control, display or indicator, it is to be designed to minimise reflections.

3.3.9 The level of lighting is to be sufficient to enable operation of user interfaces. Lighting levels in accordance with Table 1.3.1 will be considered to satisfy this requirement.

Table 1.3.1 Specific lighting levels

Work area	Ideal lux	Minimum lux
General Lighting	540	220
Control room consoles (front)	540	320
Control room consoles (rear)	325	110
Local operating panels	540	320
Remote operating panels	540	320

3.3.10 To avoid interference with night vision, all illumination and lighting of instruments, keyboards and controls are to be adjustable down to zero, except the lighting of alarm and warning indicators and the controls of dimmers which are to remain readable.

3.3.11 Seating provided for use at control stations is to allow for varying height and/or reach needs of operators. Seating arrangements are to minimise the need for twisting and/or turning motions by the operator.

3.3.12 Physical hazards, e.g., sharp edges, protuberances and trip hazards, are to be avoided.

3.3.13 Sufficient hand-rails or equivalent are to be fitted to enable operators to move and stand safely in rough seas.

3.3.14 Work surfaces are to be capable of withstanding oils and solvents common to ships and are to be easy to clean.

3.4 Operator interface

3.4.1 The design of the operator interface is to permit the satisfactory monitoring, control and supervision of the machinery and equipment.

3.4.2 Information is to be presented to the operator consistently both within and between different interfaces, *see* 3.6.2 to 3.6.4.

3.4.3 The response of the machinery and equipment to operator input is to be consistent between interfaces for the same function.

3.4.4 Visual, audible or mechanical feedback is to be provided to indicate that operator input has been acknowledged.

3.4.5 Functions requested by the operator are to be confirmed by the displays on completion.

3.4.6 Indications and documentation are to be in English or the language of the crew.

3.5 Controls

3.5.1 Operator inputs are to be checked for errors, for example, out of range data or incorrect actions, and alert the operator when they occur.

3.5.2 Means to rapidly and safely correct wrong inputs or commands are to be provided.

3.5.3 Assistance is to be provided to the operator to recover from operator errors, for example, through advisory screens where the automation system has this facility.

3.5.4 Operator confirmation is to be provided for any control action that could affect the safety of the ship, i.e., they should not rely on single keystrokes.

3.5.5 The purpose of each control is to be clearly indicated. Where standard symbols have been internationally adopted, they should be used.

3.5.6 The settings of mechanical controls are to be immediately evident.

3.5.7 The means of operation of mechanical controls is to be consistent with expectations.

3.5.8 Controls or combined controls and indicators are to be distinguishable from indicators.

3.5.9 Where control is provided by touch screens, the size of the soft keys are to be of a sufficient size for operation in areas where vibration occurs or gloves are likely to be worn.

3.5.10 Where virtual keypads/keyboards or dialogue boxes are used on touch screens, they are not to obscure status or alarm areas of the display.

3.5.11 Keyboards are to be divided logically into functional areas. Alphanumeric, paging and specific system keys are to be grouped separately.

3.5.12 The arrangement of controls that affect the safe operation of the ship should minimise the possibility of inadvertent operation.

3.6 Displays

3.6.1 The displays and indicators are to present the operator with clear, timely and relevant information.

3.6.2 Graphical symbols and colour coding are to be consistent. The graphical symbols of display functions are to be in accordance with a recognised international standard, for example, ISO 14617, *Graphical symbols for diagrams*. Colour coding of functions and signals is to be in accordance with a recognised international standard, for example, ISO 2412:1982, *Shipbuilding – Colours of indicator lights*.

3.6.3 The symbols used in mimic diagrams for the services listed in Pt 10, Ch 1,1.5.1 are to be consistent across all displays.

3.6.4 The display of information is to be consistent with respect to screen layout and arrangement of information.

3.6.5 Flashing of information is to be reserved for unacknowledged alerts, or transient states, for example, valve moving.

3.6.6 The functions supported by a display are to be clearly indicated. For displays that can support multiple functions it is to be possible to select the display associated with the primary function or an overview by a simple operator action.

3.6.7 The operating mode of the machinery and equipment is to be clearly indicated.

3.6.8 In general, indications provided by instrumentation which are displayed digitally are not to change more frequently than twice per second.

3.6.9 To indicate an increasing value in a single direction, on a fixed circular scale, the pointer is to move clockwise. If the pointer is fixed, the scale is to move anticlockwise to indicate an increase in value.

3.6.10 To indicate an increasing value on a horizontal linear scale, the pointer is to move from left to right. On a vertical linear scale, the pointer is to move upwards to indicate an increase in value.

3.6.11 The pointer is not to obscure the numbers on the scale.

3.6.12 Alphanumeric data, text, symbols and other graphical information is to be readable from relevant operator positions under lighting conditions as specified in 3.3.9. Character height in millimetres is to be not less than three and a half times the reading distance in metres and character width is to be 0,7 times the character height.

3.6.13 A simple sans-serif character font is to be used in displays. In descriptive text, lower case letters are to be used, where appropriate, as opposed to capitals to improve readability.

3.6.14 Where information related to the safe operation of machinery and equipment is provided, it is to be continuously available to the operator.

3.6.15 Failures are to be indicated in a clear and unambiguous manner. Sufficient information is to be provided for the operator to identify the cause of the failure.

Existing Sections 3 *to* 6 *has been renumbered* Section 4 *to* 7.

■ *Section ~~3~~ 4*
Unattended machinery space(s) – UMS notation

~~3.2~~ 4.2 Alarm systems for machinery

~~3.2.2~~ 4.2.2 ~~Audible~~ An audible signal and visual indication of machinery alarms ~~is~~ are to be relayed to the engineers' accommodation so that engineering personnel are made aware that a fault has occurred.

~~3.2.4~~ 4.2.4 ~~Audible~~ An audible signal and visual indication of machinery alarms ~~is~~ are to be relayed to the navigating bridge control station in such a way that the navigating officer of the watch is made aware when:

(a) a machinery fault has occurred;
(b) the machinery fault is being attended to; and
(c) the machinery fault has been rectified.

~~3.2.5~~ 4.2.5 Group alarms may be arranged on the bridge to indicate machinery faults, but alarms associated with faults requiring speed or power reduction or the automatic shut down of propulsion machinery are to be identified by separate group alarms or by individual ~~alarm parameters~~ alarms.

Volume 2, Part 10, Chapter 1

Electrical Engineering

Effective date 1 January 2013

■ *Section 1*
General requirements

1.2 Plans for design review

1.2.1 ~~At least three copies of the plans and particulars in 1.2.2 to 1.2.16 are to be submitted for consideration. Single copies only are required of plans in 1.2.17 to 1.2.22. Additional copies are to be submitted when requested.~~ The plans and particulars in 1.2.2 to 1.2.18 are to be submitted for design review.

1.2.3 A design statement of the electrical power system which details the capability and functionality under defined operating and emergency conditions is to be submitted. The design statement is to be agreed between the designers and Owners/Operators and is to include:

(a) a description of operation of the main and emergency electrical power systems;
(b) an earthing philosophy document that defines the basic approach to be taken for earthing the electrical power systems and all electrical loads; and
(c) schedule of normal and emergency operating loads on the system estimated for the different operating conditions expected. The following details are to be provided to meet this requirement:
    (i) a description of the expected operating profiles (e.g., the number of generating sets connected when manoeuvring, at sea, etc.), including as required by Pt 2, Ch 1,2.1.1; and
    (ii) a schedule of the normal and emergency operating loads, which is to state the kilowatt rating of each load and a load factor between 0 and 1. The load factor is defined as the ratio of the calculated load to the maximum load possible over a declared duty cycle. As such the load factor shall reflect:
        - the duty cycle of the load; and
        - the proportion of its maximum rating at which the load is expected to operate.
(d) the quality of power supplies required for each designated load, where this is required by 1.8.3.

Existing paragraphs 1.2.3 *to* 1.2.16 *have been renumbered* 1.2.4 *to* 1.2.17.

~~*1.2.9*~~ *1.2.10* Details of electrically-operated fire, ship, crew and embarked personnel emergency safety systems which are to include typical single line diagrams and arrangements, showing main vertical and, where applicable, horizontal fire zones, spaces along the ship bottom that are not fitted with a double bottom and the location of equipment and cable, including identification of relevant areas of high fire risk, to be employed for:

(a) emergency lighting (other than where accumulator emergency lanterns are to be installed);
(b) accommodation fire detection, alarm and extinction systems;
(c) fixed water-based local application fire-fighting systems;
(d) crew and embarked personnel address system;
(e) general emergency alarm;
(f) watertight doors, bow, stern and shell doors and other electrically operated closing appliances; and
(g) low location lighting.

NOTE
A general arrangement plan of the complete ship showing the main vertical fire zones, spaces along the ship bottom that are not fitted with a double bottom and the location of equipment and cable routes, including identification of relevant areas of high fire risk, for the above systems, is to be made available for the use of the Surveyor on board.

1.3 Plans required for supporting evidence

1.3.1 The plans and particulars in 1.3.2 to 1.3.5 are to be submitted as supporting evidence.

~~*1.2.17*~~ *1.3.2* In order to establish compliance with ~~1.11.2~~ 1.12.2 and 5.1.5 to 5.1.7, a general arrangement plan of the ship showing the location of major items of electrical equipment, for example:

- main and emergency generators;
- switchboards;
- section boards and distribution boards supplying essential and emergency services;
- emergency batteries;
- motors for emergency services; and
- cable routes between these items of equipment.

~~*1.2.18*~~ *1.3.3* Arrangement plans of main and emergency switchboards, and section boards~~.~~, and documentation that demonstrates that creepage and clearance distances are in accordance with 7.5.

~~*1.2.19* Schedule of normal and emergency operating loads on the system estimated for the different operating conditions expected.~~

~~*1.2.20*~~ *1.3.4* A Failure Modes and Effects Analysis (FMEA) is required to be submitted, *see* Pt 1, Ch 2,3.3.8. The FMEA is to verify the availability of electrical power to essential services in the event of a failure of a system or item of equipment, *see* 5.2.4.

~~*1.2.21*~~ *1.3.5* In order to establish compliance with the requirements of ~~1.6.3,~~1.7.3, when requested, evidence is to be submitted to demonstrate the suitability of electrical equipment for its intended purpose in the conditions in which it is expected to operate.

~~*1.2.22*~~ *1.3.6* Where deviation from the specific requirements of these Rules is required, details of the arrangements with documented justification and/or analysis are to be submitted, *see* 1.1.6.

Existing sub-Sections 1.3 *to* 1.20 *has been renumbered* 1.4 *to* 1.21.

~~1.7~~ 1.8 Quality of power supplies

~~*1.7.5*~~ *1.8.5* Where the electrical class notation **ELS** is to be assigned~~, the quality of electrical supplies is to comply with STANAG 1008, or a relevant and acceptable naval standard. Reference is to be made to 1.8.~~, *see* 1.8.1.

~~1.8~~ 1.9 Quality of power supplies – ELS notation

~~*1.8.1*~~ *1.9.1* Where electrical power for the designated loads in the design statement of 1.2.3~~, suitable for supplying sensitive military loads,~~ is provided in accordance with the applicable provisions of a relevant and acceptable naval standard, such as STANAG 1008, the class notation **ELS** may be assigned.

~~*1.8.2*~~ *1.9.2* The electrical system is to be stable ~~under foreseen operational conditions when supplying both the sensitive military loads and other normal sea-going loads~~ in all operating profiles defined in accordance with the design statement.

~~*1.8.3*~~ *1.9.3* The quality of the power supplies ~~is~~ for the loads listed in the design statement are to comply with the standard, in place of the limits specified by ~~1.7.2~~ 1.8.2 and ~~1.7.3~~ 1.8.3. This level of quality is to be present at the point where the load is connected to the electrical power system.

~~1.12~~ 1.13 Earthing of non-current carrying parts

~~*1.12.10*~~ *1.13.10* The connection of the earthing conductor to the hull of the ship is to be made in an accessible position, and is to be secured by a screw or stud of ~~diameter~~ a diameter appropriate for the size of the earthing conductor, but not less than 6 mm which is to be used for this purpose only. Bright metallic surfaces at the contact areas are to be ensured immediately before the nut or screw is tightened and, where necessary, the joint is to be protected against electrolytic corrosion. The connection is to remain unpainted.

~~1.13~~ 1.14 Bonding for the control of static electricity

~~*1.13.2*~~ *1.14.2* Where bonding straps are required for the control of static electricity, they are to be robust, that is, having a cross-sectional area of ~~about~~ at least 10 mm^2, and are to comply with ~~1.12.6~~ 1.13.6 and ~~1.12.10~~ 1.13.10.

~~1.14~~ 1.15 Alarms

~~*1.14.1*~~ *1.15.1* Where alarms are required by this Chapter they are to be arranged in accordance with Pt 9, Ch 1,2.3. Sound signal equipment, fire and general alarm bells are not required to be supplemented by visual ~~alarms~~ indications, except in areas having high levels of background noise, such as machinery spaces.

~~*1.14.4*~~ *1.15.4* Electrical equipment and cables for emergency alarms are to be so arranged that the loss of alarms in any one area due to localised fire, collision, flooding or similar damage is minimised, *see* ~~1.17~~ 1.16 to 1.18.

~~1.17~~ 1.18 Operation under fire conditions

~~*1.17.1*~~ *1.18.1* As a minimum, the following emergency services and their emergency power supplies are required to be capable of being operated under fire conditions:

- Emergency fire pump.
- Control and power systems to power-operated fire doors and status indication for all fire doors.
- Control and power systems to power-operated watertight doors and their status indication.
- Emergency lighting.
- Fire and general emergency alarms.
- Fire detection systems.
- Fire-extinguishing systems and fire-extinguishing media release alarms.
- Fire safety stops, *see also* 17.6.
- Low location lighting, *see also* 18.4.3.
- Crew and embarked personnel address systems.

■ *Section 5*
Supply and distribution

5.4 Insulated distribution systems

5.4.1 A device(s) is to be installed for every insulated distribution system, whether primary or secondary, for power, heating and lighting circuits, to continuously monitor the insulation level to earth and to operate an alarm in the engine control room, or quivalent attended position, in the event of an abnormally low level of insulation resistance, *see also* Pt 9, Ch 1,3.2.

■ *Section 6*
System design – Protection

6.9 Load management

6.9.2 Arrangements are also to be made such that, where applicable, the maximum load that can be applied to generators driven by prime movers is not in excess of that determined by Pt 2, Ch 1,9.3.2 and Pt 2, Ch 2,7.3.4

Existing paragraphs 6.9.2 *to* 6.9.4 *have been renumbered* 6.9.3 *to* 6.9.5.

■ *Section 7*

Switchgear and control gear assemblies

7.5 Creepage and clearance distances

7.5.1 ~~The shortest distances between conductive parts and between conductive parts and earth in air or along the surface of an insulating material, are to be suitable for the rated voltage having regard to the nature of the insulating material and the transient over voltages developed by switching and fault conditions. This requirement may be satisfied by subjecting each assembly type to an impulse voltage test in accordance with its constructional Standard or, alternatively, maintaining the minimum distances for bare conductive parts in switchgear and control gear assemblies given in Table 1.7.1.~~ The shortest distances between conductive parts and between conductive parts and earth, in air or along the surface of an insulating material, are to be suitable for the rated voltage having regard to:

- the nature of the insulating material;
- the transient over voltages developed by switching and fault conditions; and
- the environment into which the assembly will be installed.

Each assembly type is to be subjected to an impulse voltage test in accordance with its constructional Standard or, alternatively the minimum distances for bare conductive parts in switchgear and control gear assemblies given in Table 1.7.1 are to be used.

~~*7.5.2*~~ *7.5.4* Suitable shrouding or barriers are to be provided in way of connections to equipment, where necessary, to maintain the minimum distances in Table 1.7.1.

~~*7.5.3* Creepage distances cannot be accurately specified as they depend upon the insulating material, dust deposits, humidity, etc. They are to be not less than the clearance distances given in Table 1.7.1, or less than 16 mm per 1000 V (rated voltage), whichever is the greater.~~

7.5.2 For assemblies with a rated voltage of up to and including 1kV, the requirement of 7.5.1 may be met by complying with IEC 60092-302 *Electrical installations in ships – Part 302: Low-voltage switchgear and control gear assemblies*:

(a) Tables 1.7.1 and 1.7.2 indicate the minimum clearance and creepage distances normally allowed.
(b) For assemblies installed in spaces where the environmental conditions are in excess of pollution degree 3 (that is conductive pollution occurs or dry, non conductive pollution occurs which is expected to be conductive due to condensation) as defined in IEC 61439-1, *Low-voltage switchgear and control gear assemblies – Part1: General requirements; the clearance distances for non-verified assemblies* are to be used.
(c) A minimum creepage distance of 16 mm is permitted for assemblies verified in accordance with the requirements of IEC 61439-2, *Low-voltage switchgear and control gear assemblies – Part 2: Power switchgear and control gear assemblies*.
(d) An alternative relevant National or International Standard may be used when an acceptable justification is submitted as part of the documentation required by 1.3.3.

7.5.3 For assemblies with a rated voltage above 1kV, the requirement of 7.5.1 may be met by complying with IEC 60092-503 *Electrical installations in ships – Part 503: Special features – AC supply systems with voltages in the range of above 1 kV up to and including 15 kV*.

(a) Tables 1.7.1 and 1.7.2 indicate the minimum clearance and creepage distances normally allowed.
(b) For main switchboards rated at above 1kV, a minimum clearance distance of 25 mm is required for busbars and other bare conductors.
(c) An alternative relevant National or International Standard may be used when an acceptable justification is submitted as part of the documentation required by 1.3.3.

~~**Table 1.7.1 Minimum clearance distances**~~

~~Rated Voltage V~~	~~Minimum clearance (mm) between phases and earth~~		~~Minimum clearance (mm) between phases~~
	~~Earthed neutral~~	~~insulated neutral~~	
~~≤660~~	~~16~~	~~19~~	~~19~~
~~1000~~	~~25~~	~~25~~	~~25~~
~~3600~~	~~55~~	~~55~~	~~55~~
~~7200~~	~~70~~	~~100~~	~~100~~
~~12000~~	~~85~~	~~140~~	~~140~~
~~15000~~	~~100~~	~~165~~	~~165~~

Table 1.7.1 Minimum clearance distances

Nominal Voltage (V)	Minimum clearance distance (mm)		
	Verified assemblies (*See* Note 2)		Non verified assemblies
	Main switchboards	Other switchgear and control gear	Main switchboards and other switch and control gear
≤250 (*See* note 1)	8	8	15
≤690 (*See* note 1)	8	8	20
≤1000 (*See* note 1)	8	8	25
<3,300	32	26	55
<6,600	60	50	90
<11,000	100	80	120
≤15,000	*See* note 3	*See* note 3	160

NOTES
1. For assemblies installed in spaces where the pollution degree is > 3, *see* 7.5.3.
2. For the verification requirements for a verified assembly refer to IEC 61439-2.
3. Clearance distances with reference to the applicable relevant National or International standards, are to be submitted for approval, *see* 1.3.3.

Table 1.7.2 Minimum creepage distance

Nominal Voltage V	Minimum creepage distance (mm)	
	Main switchboards	Other switchgear and control gear
≤250 (See Note 1)	20	20
≤690 (See Note 1)	25	25
≤1000 (See Note 1)	35	35
<3,300	48	*See* Note 2
<6,600	90	70
<11,000	150	120
≤15,000	*See* Note 2	*See* Note 2

NOTES
1. For verified assemblies a minimum creepage distance of 16 mm is permitted for LV switchboards, *see* 7.5.3.
2. Creepage distances, with reference to the applicable relevant National or International standards, are to be submitted for approval, *see* 1.3.3.

7.8 Earthing of high-voltage switchboards

7.8.2 Protective shutters associated with withdrawable parts are to be clearly marked, e.g., by colour coding, to indicate the incoming and outgoing circuits and bus tie connections.

Section 9
Rotating machines

9.1 General requirements

9.1.9 ~~AC~~ Propulsion motors and generators ~~and motors for~~ that form part of the electrical propulsion systems are to have at least one embedded temperature detector (ETD) in each phase of the machine winding in locations which may be subjected to the highest temperature. Where there are two coil sides per slot the ETD's are to be located between the insulated coil sides in the slot, *see* 16.1.3.

Section 14
Electrical equipment for the use in explosive gas atmospheres or in the presence of combustible dusts

14.9 Cable and cable installation

~~*14.9.1* Electric cables are not to be installed in hazardous zones or spaces, except when forming part of an intrinsically safe circuit or where specifically permitted elsewhere in this Section.~~

Existing paragraphs 14.9.2 *to* 14.9.8 *have been renumbered* 14.9.1 *to* 14.9.7.

Section 17
Fire safety systems

17.1 Fire detection and alarm systems

17.1.1 Fire detection and alarm systems are to be in accordance with Chapter 9 of the *Fire Safety Systems Code (FSS Code)* and 17.1.2 to 17.1.15.

Existing paragraphs 17.1.1 *to* 17.1.10 *have been renumbered* 17.1.2 *to* 17.1.11.

~~*17.1.8*~~ *17.1.9* Detectors and manually operated call points are to be grouped into sections. The activation of any detector or manually operated call point is to initiate a visual indication and audible fire alarm signal at the control panel and indicating units. If the signals have not received attention within two minutes an audible ~~alarm~~ signal is to be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces of Category A. This alarm sounder system need not be an integral part of the detection system.

~~*17.1.11* Detectors fitted in cabins, when activated, are also to be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located.~~

~~*17.1.18* Where it is intended that detectors be installed in external locations, in addition to meeting the requirements for an environmental category suitable for open decks, *see* Pt 9, Ch 1,2.8.7, they are also to be tested for sun irradiation and ultraviolet exposure with satisfactory results.~~

Section 21
Testing and trials

21.2 Trials

21.2.6 In addition to 21.2.5, unless it has been satisfactorily shown by the design verification and validation process required by ~~1.8.5~~ 1.9.5, that the power supply quality complies with the requirements of the defined standard, then compliance is to be demonstrated by measurements taken at the ~~switchboards/section boards used to supply sensitive military~~ loads, as defined by the Naval Authority, *see* ~~1.8.1~~ 1.9.1.

Volume 3, Part 1, Chapter 2

Integrated Propulsion Systems

Effective date 1 January 2013

■ *Section 1*
General requirements

1.2 Plans

1.2.3 **System operational concept.** A description of how the control, alarm and safety systems for the integrated propulsion system provide effective means for operation and control during all ship operational conditions.

~~1.2.3~~ 1.2.4 **Alarm systems.** Details of the overall alarm system linking the machinery space control station with the bridge control station are to be submitted~~.~~ including details of alerts to be presented by the user interface, with:

(a) an approach to alert category assignments which is in accordance with the IMO *Code on Alerts and Indicators, 2009*; and

(b) for alarms required by these Rules the intended operator response and the message to be presented.

Existing paragraphs 1.2.4 *and* 1.2.5 *have been renumbered* 1.2.5 *and* 1.2.6.

■ *Section 3*
Control arrangements

3.2 Alarm system

3.2.7 Alarm indication is to be both audible and visual. If arrangements are made to silence audible ~~alarms~~ signals they are not to extinguish visual alarms.

3.2.8 The acceptance of an alarm on the bridge is not to silence the audible ~~alarm~~ signal in the machinery space.

3.2.9 Machinery ~~alarms~~ signals should be distinguishable from other audible ~~alarms~~ signals, e.g. fire, carbon dioxide.

3.2.10 Acknowledgement of visual alarms is to be clearly shown.

3.2.11 If the audible ~~alarm~~ signal has been silenced and a second fault occurs before the first has been rectified, the audible ~~alarm~~ signal is again to operate. To assist in the detection of transient faults which are subsequently self-correcting, fleeting alarms should lock-in until accepted.

3.2.12 Arrangements should be made to enable alarm lights on the bridge to be dimmed as required, *see also* Vol 2, Pt 9, Ch 1,3.6.16.

Volume 3, Part 2, Chapter 1

Noise and Vibration Levels in Personal Spaces

Effective date 1 January 2013

■ *Section 1*
General requirements

1.1 Scope

1.1.7 The sound pressure levels for audible alarms and public address systems fitted in accordance with other sections of the Rules are to satisfy IMO Resolution A.1021(26) *Code on Alerts and Indicators, 2009*. Alternative arrangements may be acceptable provided they are acceptable to the Naval Authority.

Existing paragraph 1.1.7 *has been reumbered* 1.1.8.

Cross-references

Section numbering in brackets reflects any Section renumbering necessitated by any of the Notices that update the current version of the Rules for Naval Ships.

Volume 1, Part 1, Chapter 3

16.3.1	1.2.3 *now reads* 1.2.4
	1.2.4 *now reads* 1.2.5

Volume 2, Part 2, Chapter 1

9.3.3 (***9.3.4***)	1.7 *now reads* 1.8
15.3.2(c)	Pt 9, Ch 1,2.3.12 *now reads* Pt 9, Ch 1,2.3.15
15.6.1	Pt 9, Ch 1,2.10.21, 2.13.2 and 2.13.7 *now reads* Pt 9, Ch 1,2.13.2, 2.13.7 and 3.6.3

Volume 2, Part 2, Chapter 2

7.3.1	7.3.2 to 7.3.7 *now reads* 7.3.2 to 7.3.5

Volume 2, Part 7, Chapter 1

Table 1.11.3	1.5.9 *now reads* 1.6.9
11.2.4 (b)	1.12 *now reads* 1.13
11.5.2	1.12 *now reads* 1.13
11.7.9	1.12 *now reads* 1.13

Volume 2, Part 7, Chapter 3

8.7.2	1.9 *now reads* 1.10

Volume 2, Part 7, Chapter 4

2.1.19	1.12 *now reads* 1.14

Volume 2, Part 9, Chapter 1

1.2.5(e) (***1.2.6***(*e*))	2.10.25 *now reads* 2.10.20
2.10.8	1.2.5 *now reads* 1.2.6
2.10.10	1.2.5 *now reads* 1.2.6
2.10.12	1.12.2 *now reads* 1.13.2
2.14.3	1.2.5 *now reads* 1.2.6
2.14.7	2.10.19 has been deleted
3.1.1 ***(4.1.1)***	3.2 *to* 3.7 *now reads* 4.2 *to* 4.7
3.7.2 ***(4.7.2)***	Table 11.3.1 *now reads* Table 1.4.1
4.1.1 ***(5.1.1)***	3.1.1 *now reads* 4.1.1
4.1.3 ***(5.1.3)***	3.6 *now reads* 4.6
4.1.4 ***(5.1.4)***	4.2 *now reads* 5.2
4.2.1 ***(5.2.1)***	4.2.2 *now reads* 5.2.2
	4.2.7 *now reads* 5.2.7
4.2.6 ***(5.2.6)***	4.2.5 *now reads* 5.2.5
5.1.1 ***(6.1.1)***	5.1 *now reads* 6.1
	5.3 *now reads* 6.3
5.1.2 ***(6.1.2)***	5.2 *now reads* 6.2
5.3.1 ***(6.3.1)***	5.2.2 *now reads* 6.2.2
	5.2.4 *now reads* 6.2.4
6.2.1 ***(7.2.1)***	6.1 *now reads* 7.1
6.3.1 ***(7.3.1)***	6.1 *now reads* 7.1
5.3.1 ***(6.3.1)***	2.10.19 has been deleted
6.1.3 ***(7.1.3)***	1.2.5 *now reads* 1.2.6

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1.1.3	1.5.1 *now reads* 1.6.1
	1.5.2 *now reads* 1.6.2
	1.5.3 *now reads* 1.6.3
1.3.3 (***1.4.3***)	1.3.2 *now reads* 1.4.2
1.3.4 (***1.4.4***)	1.3.2 *now reads* 1.4.2
	1.3.3 *now reads* 1.4.4
1.4.4 ***(1.5.4)***	1.2.3 *now reads* 1.2.4
	1.2.4 *now reads* 1.2.5
1.5.3 (***1.6.3***)	1.5.1 *now reads* 1.6.1
	1.5.2 *now reads* 1.6.2
1.9.5 (***1.10.5***)	1.9.4 *now reads* 1.10.4
1.11.1(a) (***1.12.1***(*a*))	1.12.2(h) *now reads* 1.13.2(h)
1.11.4(c) (***1.12.4***(*c*))	1.14.4 *now reads* 1.15.4
1.11.3(c) (***1.12.3***(*c*))	1.8 *now reads* 1.9
1.11.14 (***1.12.14***)	1.9 *now reads* 1.10
1.12.1 ***(1.13.1)***	1.12.2 *now reads* 1.13.2
1.12.2 (***1.13.2***)	1.12.1 *now reads* 1.13.1
1.12.4 ***(1.13.4)***	14.9.3 *now reads* 14.9.2
1.14.3 (***1.15.3***)	1.17 *now reads* 1.18
1.17.2 (***1.18.2***)	1.17.1 *now reads* 1.18.1
1.17.3 (***1.18.3***)	1.17.1 *now reads* 1.18.1
1.17.4 (***1.18.4***)	1.17.1 *now reads* 1.18.1
1.20.2 (***1.21.2***)	1.20.1 *now reads* 1.21.1
2.4.2	1.7.2 *now reads* 1.8.2
5.1.1	1.8.4 *now reads* 1.9.4
5.2.4	1.5.1 *now reads* 1.6.1
5.5.7	1.8.4 *now reads* 1.9.4
5.8.1	1.5.1 *now reads* 1.6.1
6.1.4	1.2.3 *now reads* 1.2.4
	1.2.4 *now reads* 1.2.5
7.18.1	1.3.2 *now reads* 1.4.2
9.1.6	1.9 *now reads* 1.10
9.3.1	1.9 *now reads* 1.10
9.3.2	1.9 *now reads* 1.10
9.3.3	1.8 *now reads* 1.9
	1.9 *now reads* 1.10
9.4.8	1.8.6 *now reads* 1.9.6
9.8.1	1.3.2 *now reads* 1.4.2
10.1.2	1.9 *now reads* 1.10.
10.1.4	1.9 *now reads* 1.10.
10.1.6	1.7.2(a) *now reads* 1.8.2(a)
10.1.13	1.3.2 and 1.3.3 *now reads* 1.4.2 and 1.4.3
10.2.2	1.9 *now reads* 1.10
10.2.11	1.7.3 *now reads* 1.8.3
10.2.16	1.7 *now reads* 1.8
10.2.18	1.3.2 *now reads* 1.4.2
10.3.12	1.3.2 *now reads* 1.4.2
10.3.10	1.4 *now reads* 1.5
11.1.3	1.3.3 *now reads* 1.4.3
11.2.1(d)	1.3.3 *now reads* 1.4.3
11.4.3	1.14.4 *now reads* 1.15.4
11.6.4	1.7 *now reads* 1.8
11.6.5	1.12.7 *now reads* 1.13.7
11.8.13	1.11 *now reads* 1.12
11.9.3	1.11 *now reads* 1.12

11.15.1	1.11.7 *now reads* 1.12.7
11.17.4	1.9 *now reads* 1.10
12.3.10	1.4.5 *now reads* 1.5.5
12.7.2	1.4.5 *now reads* 1.5.5
12.7.3	1.4.2 *now reads* 1.5.2
14.9.4 ***(14.9.3)***	1.11.3 *now reads* 1.12.3
15.5.5	1.4.5 *now reads* 1.5.5
16.5.8	1.7 *now reads* 1.8
17.1.2 ***(17.1.3)***	1.14 *now reads* 1.15
	1.16 *now reads* 1.17
17.3.3	1.13 *now reads* 1.14
	1.14 *now reads* 1.15
17.3.8	1.11.1 *now reads* 1.12.1
17.7.1	1.13 *now reads* 1.14
	1.14 *now reads* 1.15
17.9.1	1.13 *now reads* 1.14 (*twice*)
	1.14 *now reads* 1.15
17.9.2	1.5.1 *now reads* 1.6.1
18.2.1	1.13 *now reads* 1.14
	1.14 *now reads* 1.15
18.2.2	1.13 *now reads* 1.14
18.3.2	1.13 *now reads* 1.14
	1.14 *now reads* 1.15
18.4.2	1.14 *now reads* 1.15
21.2.3(*b*)	1.11.2 *now reads* 1.12.2
21.2.5	1.7 *now reads* 1.8
Table 1.9.1	1.9 *now reads* 1.10

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9.1.13	1.12 *now reads* 1.13
9.2.7	1.12 *now reads* 1.13

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